We claim:

1. A method of evaluating characteristics of a semiconductor wafer comprising the steps of:

periodically exciting a region on the surface of the wafer;

monitoring the modulated optical reflectivity induced by said periodic excitation and generating first output signals in response thereto;

directing a polychromatic probe beam having both visible and ultraviolet wavelengths and a known polarization state to reflect off the surface of the sample;

monitoring the change in polarization state of the probe beam induced by reflection at a plurality of wavelengths and generating second output signals in response thereto; and

evaluating the implantation characteristics based on a combination of the first and second output signals.

2. A method as recited in claim 1, wherein the first and second output signals are combined in an iterative process to find a best fit solution.

3. An apparatus for evaluating the characteristics of a semiconductor wafer comprising:

an intensity modulated pump laser beam, said pump laser beam being directed to a spot on the surface of the sample for periodically exciting the wafer;

a probe laser beam being directed to a spot on the surface of the wafer within a region which has been periodically excited and is reflected therefrom;

a detector for measuring the power of the reflected probe laser beam and generating a first output signal in response thereto;

a broadband polychromatic light source for generating a polychromatic probe beam having both visible and ultraviolet wavelengths and a known polarization state, said polychromatic probe beam being directed to reflect off a spot on the surface of the sample;

an analyzer for monitoring the change in polarization state of the reflected polychromatic probe beam and generating a plurality of second output signals corresponding to a plurality of different wavelengths within the polychromatic probe beam; and

a processor for filtering the first output signal to provide a measure of the magnitude or phase of the modulated optical reflectivity of the sample, said processor further functioning to monitor the second output signals and with the first and second output signals being combined to evaluate the implantation characteristics of the wafer.

4. An apparatus as recited in claim 3, wherein the probe beam from the polychromatic light source is directed to the same location as the probe laser beam is directed.

5. An apparatus as recited in claim 3, further including a steering means for adjusting the lateral separation between the pump and probe laser beam spots on the surface of the sample and wherein a plurality of

measurements are taken at different separations between the pump and probe laser beam spots.

6. An apparatus as recited in claim 3, further including a means for varying the modulation frequency of the pump laser beam and wherein a plurality of measurements are taken at different modulation frequencies.

7. An apparatus as recited in claim 3, wherein the first and second output signals are combined in an iterative process to find a best fit solution.

8. An apparatus as recited in claim 3 wherein said polychromatic light source includes one or more lamps selected from the group consisting of xenon and deuterium.